Published Project Report
PPR385

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Carsickness: preventive measures

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Transport Research Laboratory

PUBLISHED PROJECT REPORT PPR 385

Carsickness

Preventive measures

by C Diels (TRL)

Project Record: **CARSICKNESS**
Client: **Mischief PR**
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Technical Referee	Nick Reed	22/08/2008

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Contents

Executive summary **1**

1 Introduction **2**

2 Preventive measures **4**

3 Preventing carsickness in children **7**

Appendix – Tips to prevent carsickness **8**

Acknowledgements **9**

References **9**

Executive summary

TRL was contacted by Esure to provide guidelines and advice regarding measures to prevent and alleviate carsickness. Following a brief introduction to motion sickness, factors that are likely to affect the occurrence of carsickness will be presented. Particular emphasis is placed on the role of new in-vehicle entertainment systems and their likely exacerbating effect on carsickness. This may be of particular relevance to the occurrence of carsickness amongst children who not only tend to be most susceptible, but also most likely to use this type of in-vehicle entertainment systems. Finally, it is concluded with a list of tips to prevent or ameliorate carsickness.

1 Introduction

Motion is primarily sensed by the organs of balance located in the inner ear and our eyes. Motion sickness can occur when these motion signals are in conflict with one another or when we are exposed to motion that we are not accustomed to, for example whilst being at sea (Oman, 1982).

Motion sickness can be caused by a wide variety of motions of the body and the visual scene and is a common problem in travellers by car, train, air, and particularly sea. Seasickness may happen whilst being below deck where a clear view of the visual scene outside the ship is lacking. Under these conditions, motion sickness occurs because the movements of the ship, as perceived by the organs of balance, are in conflict with the motion perceived by the eyes, which indicate a static visual surround. Similarly, carsickness may occur whilst reading a book; the static visual scene perceived by the eyes does not correspond to the motion of the car. Around 60% of the population has experienced some nausea from car travel, whereas about a third has vomited in cars before the age of 12. Susceptibility to motion sickness is at a maximum at some age between about 2 and 12 years and then begins to decline.

Besides conflicting motion signals from the eyes and our organs of balance, motion sickness can also occur when we are exposed to motion that we are not accustomed to. In normal daily life, we move our body at a high rate whilst walking, running, or cycling. However, whilst aboard a ship, for example, we are exposed to motion that we are unfamiliar with. The slowly heaving motion of a ship, for example, differs so much from the motion our bodies are evolutionary supposed to be exposed to that our brain gets confused and somehow things the body has been poisoned. As a consequence, the body ultimately responds with retching and vomiting, which is often preceded by feelings of stomach awareness and nausea.

Similar to the motion aboard a ship, the motion whilst driving in a car can also be perceived to be highly unnatural and, consequently, the body responds in a similar way leading to carsickness. As with the motion of ship, it is the unnatural slow movements, or low frequency motion, in particular that makes individuals susceptible to carsickness. Driving in a straight line does not cause any problems. Hence, carsickness at motorways is fairly uncommon except in the most susceptible. Driving along windy roads, driving aggressively involving excessive acceleration, braking, and cornering, and driving too fast over speed bumps and roundabouts on the other hand, is more likely to result in passengers suffering from carsickness (Guignard & McCauley, 1990; Turner & Griffin, 1999). Thus, a smooth driving style not only reduces the likelihood of carsickness, but has the added advantage of saving fuel!

Carsickness and in-vehicle displays

As mentioned, carsickness may occur when motion sensed by the eyes differs from the motion felt by our organs of balance. This may be the case when reading a map whilst driving: the motion sensed by the eyes indicates you are stationary, whereas the organs of balance correctly indicate that you are moving (Griffin & Newman, 2004).

The increasing popularity of rear-seat entertainment displays for viewing TV programs, DVDs, or playing video games means that the incidence of carsickness is likely to increase. Similar to reading a map or book whilst driving, the image displayed on the in-car screens does not correspond to the motion of the vehicle. Thus, a similar conflict occurs whereby the motion sensed by the eyes does not coincide with that sensed by our organs of balance, which ultimately may lead to carsickness.

Ironically, it is those most susceptible to carsickness who are likely to suffer most: Not only are children between the ages of 2-12 particularly susceptible to motion sickness, they are also the ones most likely to use these in-car entertainment systems!

Scientific research indicates that these in-vehicle entertainment systems indeed increase the likelihood of carsickness (Kato & Kitazaki, 2008). In a recent study, 20 people were driven around for 30 minutes whilst sitting in the backseat either watching the road ahead, or a rear-seat display showing written text. During each of the two drives, the participants were asked to verbally rate their motion sickness on a motion sickness scale that ranged from 0 ("No symptoms, I feel fine") to 6 ("moderate nausea, I want to stop"). As expected, the results of this study showed that watching the in-car screen led to significantly higher levels of carsickness.

2 Preventive measures

Various countermeasures have been proposed for the prevention of carsickness. Whereas there appears to be little scientific support for some measures, all measures that reduce conflicting motion information, prevent factors that might aggravate nausea, and promote psychological factors which enable the sufferer to cope with his/her condition can be useful to alleviate carsickness.

Maintain a clear view of the road ahead

Avoiding conflicting visual information, such as that obtained by looking at objects inside a car, is the most beneficial measure to prevent carsickness from occurring. Reading, playing board games, and watching movies using in-vehicle entertainment systems (i.e. DVD) significantly increase the likelihood of carsickness.

Sufferers from carsickness should be in a position to see the road directly ahead. If possible, sit in the front seat and look forward at the horizon rather than sideways. The furthest visible position along the road ahead tends to be the best focal point.

To allow small children on the rear seats a good view, it is advised to raise the height of the child and finding a position where the forward view is not obstructed by a seat or head restraint. A rigid approved booster seat may be most effective in allowing the child to see forward between the front seats or between the seat and the side windows.

If a clear view of the road is not available, it is advisable to close one's eyes.

Avoid head movements

Carsickness tends to be greater when the head is free to move whereas a stable head position reduces the likelihood of carsickness. In particular, head movements should not be made before, during or following turning or braking. It is also advised not to incline the head forwards. Maintaining a stable head position can be helped by an unobstructed forward view and suitable headrests. Children games that require them to observe objects in the passing scenery should also be avoided.

Avoid circumnavigating windy roads

Carsickness is particularly prevalent on windy roads. The magnitudes of lateral vehicle motion (sway) on windy country roads increase the likelihood of carsickness when compared to travelling at motorways and dual-carriage ways.

Adopt a smooth driving style

An aggressive driving style involving excessive acceleration, braking, and cornering is more likely to result in passengers suffering from carsickness. Avoid driving too fast over speed bumps, on roundabouts and windy roads.

Avoid long unbroken rides

Carsickness gradually builds up over time. Hence, shorter trips with regular breaks help to avoid carsickness. Long unbroken rides, especially during hot summer days are to be avoided. Especially with children, it is advisable to travel in the evening or at night, provided you are not tired.

Distraction

Concentrating one's attention and mental effort on some kind of task reduces the chances of carsickness. This also partly explains the fact that drivers are hardly ever carsickness whereas passengers are. Worrying about being sick, on the other hand, increases the likelihood of actually getting sick. Word rhyme games or singing are beneficial to children travelling in cars.

Diet

Never travel on an empty stomach, but avoid heavy meals before travelling and stay clear of food that in itself may be nauseating such as sweets, fatty or spicy foods, and

sour fruits. Whilst travelling, regular light snacks (sandwiches, crackers, apples, bananas, cucumber) are more suitable. It is also important to drink sufficiently, but avoid fizzy drinks as these put pressure on the stomach. Alcohol consumption is also to be avoided.

Fresh air

Although fresh air in itself is not sufficient to prevent motion sickness from occurring as evidenced by the occurrence of seasickness, the provision of good ventilation, or breathing through a hanky soaked in lavender water for example, will make those suffering from carsickness more comfortable and this may aid the fight against nausea and vomiting.

Wear sunglasses

Some sufferers from carsickness may find it beneficial to wear sunglasses as these reduce visual simulation. In a similar vein, travelling at night tends to decrease the incidence of carsickness.

Anti-motion sickness drugs

There are many drugs, both over the counter and prescription, which help to alleviate or delay the onset of carsickness. To be effective, anti-motion sickness drugs typically need to be taken at least half an hour to an hour before travelling.

The two most commonly used groups of drugs are scopolamine preparations (e.g. Kwells, Joy-rides, Sereen) and antihistamines (e.g. Stugeron, Marzine, Sea legs). Scopolamine preparations are short-acting and therefore most useful for short journeys. However, these drugs are known to cause side effects such as blurred vision, dry mouth and affect the heart rate. The most common side effect of antihistamines is drowsiness. When taking antihistamines, alcohol should not be consumed on the same day.

Considering that there are large differences between individuals in responses to anti-motion sickness drugs, as well as the fact that anti-motion sickness drugs may negatively affect driving abilities, it is advisable to seek advice from a pharmacist on what drugs best to use. Especially drivers should carefully consider the use of anti-motion sickness drugs and ensure that the drugs have no side effects that could affect their driving abilities. The side-effects of anti-motion sickness drugs can be significantly pronounced when used in combination with other drugs, for example anti-allergic drugs or antidepressants. This may severely compromise driving abilities and the use of anti-motion sickness drugs in combination with other drugs is strongly discouraged.

Controlled regular breathing

Controlled regular breathing increases motion tolerance significantly and has been estimated to be half as effective as anti-motion sickness drugs, but is rapid to implement and free of any side effects.

Root ginger

A popular over-the-counter preparation used against motion sickness is the powdered ginger root. Root ginger has been suggested to calm gastric function. However, although the use of ginger may be beneficial to some sufferers, the scientific evidence for its effectiveness is inconclusive.

Homeopathic remedies

Homeopathic substances that have been suggested to prevent or alleviate motion sickness include Cocculus, Nux Vomica, and Petroleum. The effectiveness of homeopathic remedies is equivocal, although recent studies indicate some homeopathic preparations to be as effective as traditional anti-motion sickness drugs.

Electrically conductive strips

In some countries, electrically conductive material to be hung from the rear of vehicles are sold which are claimed to prevent carsickness. However, there appears to be no published scientific evidence showing that these devices are effective.

Acu-pressure bands

Acupressure above the wrist is popular among yachtsmen, and devices to maintain pressure are commercially available. However, the effectiveness of these devices is questionable and there appears to be no evidence that acupressure is of value in alleviating or preventing motion sickness from occurring.

Nevertheless, the placebo effect of Acupressure bands can be beneficial to some individuals. This argument holds true for any form of treatment and can be applied to electrically conductive strips, homeopathic substances, and herbal remedies such as ginger.

3 Preventing carsickness in children

Considering their relatively high susceptibility to motion sickness, carsickness can be particularly debilitating in children. In addition, having to deal with sick children in the rear seat may also cause distraction on behalf of the person driving the vehicle. This in turn may lead to unsafe driving situations. Hence, preventing carsickness in children may be particularly beneficial.

As already mentioned, maintaining a clear view of the road ahead is the most beneficial measure to prevent carsickness from occurring. In this way, conflicting motion information from the eyes and the organs of balance is avoided. This also means that games that require children to look inside the car, such as board games or handheld video console games are better to be avoided.

It is also advisable to avoid games that require children to move their heads. Carsickness tends to be greater when the head is free to move whereas a stable head position reduces the likelihood of carsickness (Cheung & Nakashima, 2006). In particular, head movements should not be made before, during or following turning or braking. It is also advised not to incline the head forwards. Maintaining a stable head position can be helped by an unobstructed forward view and suitable headrests. Children games that require them to watch objects in the passing scenery and hence require them to move their heads should be avoided. Games such as counting cows, I spy, spotting the number of red cars, are therefore likely to make things worse.

Distraction has also been shown to have a positive effect. However, note that any distraction that involves children looking at objects inside the car are likely to make things worse. Reading, making puzzles, drawing, watching DVDs or playing video games are not recommended, especially with children that are particularly susceptible. More suitable ways to distract children away from feelings of carsickness include storytelling, question and answer games, listening to audio books, or having them sing along with their favourite songs.

Appendix – Tips to prevent carsickness

How to avoid carsickness?

- Maintain a clear view of the road ahead
- Don’t read or write
- Maintain a stable head position
- Adopt a smooth driving style
- Avoid circumnavigating windy roads
- Make regular brakes
- Provide good ventilation
- Provide distraction
- Don’t travel on an empty stomach but avoid greasy or sour food and fizzy drinks
- Avoid travelling at high temperatures

What to do if you do suffer from carsickness?

- Maintain a clear view of the road ahead
- If a clear view is unavailable, close your eyes
- Keep your head still
- Take a break if possible
- Ensure good ventilation and avoid unpleasant smells
- Seek distraction
- Don’t eat greasy or sour food or drink fizzy drinks

Acknowledgements

The work described in this report was carried out in the Human Factors and Simulation group of the Transport Research Laboratory. The authors are grateful to Nick Reed who carried out the technical review and auditing of this report.

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Price code: 1X

ISSN 0968-4093

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Published by

IHS
Willoughby Road, Bracknell
Berkshire RG12 8FB
United Kingdom
T: +44 (0) 1344 328038
F: +44 (0) 1344 328005
E: trl@ihs.com
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ISBN 978-1-84608-768-4

9 781846 087684

PPR385